

Maternal mood, infant temperament and shared joy in mother-child interaction

Reetta Varpula
Syventävien opintojen kirjallinen työ
Tampereen yliopisto
Lääketieteen yksikkö
Helmikuu 2014

Tampereen yliopisto
Lääketieteen yksikkö
Lastenpsykiatrian yksikkö

REETTA VARPULA: MATERNAL MOOD, INFANT TEMPERAMENT AND SHARED JOY IN
MOTHER-CHILD INTERACTION

Kirjallinen työ, 17s.
Ohjaaja: professori Kaija Puura

Helmikuu 2014

Avainsanat: early interaction, postnatal depression, infant temperament.

Äidin synnytyksen jälkeinen masennus vaikuttaa äidin ja lapsen väliseen vuorovaikutukseen, ja tämän on todettu johtavan lapsen myöhempiin käyttäytymisen häiriöihin sekä kognitiivisiin ongelmiin. Keskinäiseen vuorovaikutukseen vaikuttaa myös lapsen temperamentin piirteet. Tutkimuksen tavoitteena oli analysoida äidin ja lapsen välisiä jaetun ilon hetkiä, ja erityisesti sitä, miten äidin masennus tai lapsen temperamentti vaikuttavat näiden hetkien määrään ja keston.

Tutkimusmetodi

Tutkimus on pilottitutkimus, joka tehtiin osana laajempaa tutkimusta Pirkanmaan alueella. 13 äiti-lapsi paria osallistuivat täyttämällä Edinburgh Postnatal Depression Scale (EPDS) –kyselyn ja Infant Behavior Questionnaire (IBQ) –kyselyn, jossa kartoitettiin lapsen temperamentin piirteitä. Tutkimukseen sisältyi lisäksi osallistuneiden kotona suoritettu 10 minuutin pituinen videointi, jossa äiti oli vuorovaikutuksessa lapsensa kanssa. Näistä videoista analysoitiin jaetun ilon hetket, eli hetket, joissa sekä äiti että lapsi hymyilevät samanaikaisesti toisilleen. Näiltä hetkiltä edellytettiin, että äidin ja lapsen välillä oli katsekontakti.

Tulokset

Äidin masennusoireiden ja jaetun ilon keston tai määrän välillä ei havaittu tilastollisesti merkittävää yhteyttä. Lapsen positiivisen affektiivisuuden sekä jaetun ilon kokonaiskeston sekä keston keskiarvon välillä sen sijaan oli tilastollisesti merkittävä positiivinen korrelaatio. Lapsen temperamenttipiirteistä pelon (IBQ-fear) ja jaetun ilon keston välillä oli negatiivinen korrelaatio. Pienen otokset vuoksi tulokset ovat suuntaa antavia ja vaativat lisäselvittelyjä.

Table of contents

1. Background	1
2. Research hypothesis	3
3. Ethical considerations and the importance of this study	4
4. Method	4
4.1. Participants	4
4.3. Assessment of the interaction.....	5
4.4. Assessment of maternal depressive symptoms	5
4.5. Assessment of infant temperament	5
4.7. Statistical analysis.....	6
5. Results.....	6
5.1. Sample description	6
5.2. EPDS scores	7
5.3. Gender	7
5.5. IBQ- Infant behavior questionnaire.....	8
5.5.1. IBQ positive effect	8
5.5.2. IBQ negative affect.....	8
5.5.3. Specific IBQ scores	8
6. Discussion.....	10
6.1. Limitations.....	13
7. Conclusions	14
8. References.....	15

1. Background

Within the first postnatal year, infants are highly dependent on their caretakers. For most part, the mother constitutes the infant's primary environment during this time, thus making the impact of depression one of particular importance (Murray, Cooper 1997a). Depression during this time has been shown to have consequences for the development of the child from infancy to adolescence, including the child's cognitive development (Murray et al. 1996) and socio-emotional functioning (Murray, Cooper 1997a, Murray et al. 1996, Murray, Cooper 1997b, Tronick, Reck 2009, Luoma et al. 2001, Weinberg, Tronick 1998b), even physical health (Mantymaa et al. 2003). The impairment of mother-infant interaction has been suggested to be an important factor through which these effects are mediated (Murray et al. 1996).

Infants instinctively strive for social interaction. The interaction within the first postnatal months is pre-verbal, and occurs through gaze, facial expression, and movements (Trevvarthen, Aitken 2001). This interaction between a mother and infant functions to regulate the infant's state of arousal and emotions (Tronick, Reck 2009). Early communication is a continuous combination of mismatching emotions and periods of reparation, and affectively synchronous interaction makes up only a small proportion of this communication (Tronick, Reck 2009, Tronick 1989). This is normal for interaction, and the reparation of mismatched emotions is associated with the experience of positive affect and the effective regulation of stress (Tronick, Reck 2009). From these experiences of repairing mismatched emotions and synchronized positive emotion the infant develops a representation of himself an effective interactor, of his interactions as positive and reparable, and of the caretaker as reliable and trustworthy (Trevvarthen, Aitken 2001).

The quality of mother-infant interaction has an impact on the quality of attachment, which in turn impacts a child's development (Malatesta et al. 1989, Teti et al. 1995). Postnatal depression increases the odds of insecure attachment (Murray et al. 1996, Teti et al. 1995). In addition, shared positive affect between mother and child was found to correlate with attachment security (Malatesta et al. 1989, De Wolff, van Ijzendoorn 1997).

The impaired patterns of interaction occurring between mother and child in the context of depression, rather than the child's exposure to the depressive symptoms as such, is thought to be important for the child's functioning (Murray, Cooper 1997b). Depression affects many aspects of interpersonal communication, including rate of speech, voice quality, eye contact and emotional expressiveness and responsiveness (Murray et al. 1996). Compared to well women, mothers with depressive symptoms showed more anger, a lower rate of overall interactive behavior, less concentration and less sensitivity when interacting with their infants (Stein et al. 1991). In several studies the mother's interactions were found to be more negative and less affirming to the infant (Murray et al. 1996, Tronick 1989, Stein et al. 1991). Furthermore, depressed mothers were involved in fewer positive interactions with their children (Cox et al. 1987). This way of interacting is an obstacle for successful interaction, impedes the infant's achievement of his interactive goal, and leads to a predominance of negative affect and self-directed regulatory behavior by the infant (Tronick 1989).

Infants use vocalization, facial expression and gaze direction in order to communicate with others, and the ability to adequately use these modalities for successful interaction is highly malleable within the first 6 months of life (Weinberg, Tronick 1994, Yale et al. 2003). Facial expressions of positive and negative emotion are central to young infants' coordinated expressive signaling during social interaction (Yale et al. 2003). Infants are extremely sensitive to the emotional states of their mothers (Murray, Cooper 1997b). The infants of postnatally depressed mothers showed less frequent positive and more frequent negative facial expressions, and more vocalization as compared to the infants of well mothers. They also look away more frequently, look weary, and protest more persistently. (Field 1995.) Several studies have shown that depressed mothers and their infants match negative behavior states more often and for longer amounts of time, and positive emotional states less often than nondepressed mother-child dyads (Tronick 1989, Field 1995).

Temperament is considered to be the biologically determined and the developmentally and environmentally influenced traits of the child that appear in the child's emotionality, activity and sociability (Derryberry, Rothbart 1988). It is also considered an independent factor affecting development (Pluess, Belsky 2010) and future psychiatric outcome (Teerikangas et al. 1998). Infant temperament also plays a role in the interaction between parent and child. It has been argued that children with negative emotionality are more malleable or susceptible

than others to both negative and positive environmental influences and to the quality of maternal care and sensitivity (Kim, Kochanska 2012). The effects of positive early relationships can even lead to superior developmental outcome (Pluess, Belsky 2010). Thus sensitive and mutually responsive parenting is especially consequential for emotionally negative children. However, the temperamental characteristics of the child and the parent's subjective perception of the child strongly influence one another (Bates, Freeland & Lounsbury 1979). Depressed mothers are more prone to evaluate their infants as difficult (Foreman, Henshaw 2002, McGrath, Records & Rice 2008, Mantymaa et al. 2006). It can therefore be argued that it is especially important to identify and treat maternal depression and consequently affect mother-infant interaction.

Imitating a child's joyous facial expression activates areas of neural functioning associated with social and maternal reward: upon smiling interactively with her child, a mother not only communicates understanding of her child's affect but also genuine happiness because her child is content, i.e. the process of parenting has been successful (Lenzi et al. 2009). In the present study my goal is to examine the frequency and duration of shared joy between mother and child, and the impact that depressive symptoms have on these parameters. The child's temperament will be taken into account.

2. Research hypothesis

The present study will be conducted under the hypothesis that the both the duration and frequency of the occasions of shared joy between a mother and her infant are more frequent with the mothers that have lower scores for depressive symptoms. The temperament of the child will most likely influence the results, and it is likely that emotional negativity will reduce the positive, i.e. more frequent and longer bouts of shared joy, and increase the chance of less frequent and shorter moments. It is likely that mothers expressing higher depressive scores will rate their infants as temperamentally more difficult than the mothers with lower scores.

3. Ethical considerations and the importance of this study

Studies conducted in Tampere, Finland have been approved by the ethical committee of Pirkanmaa hospital district.

Depressive symptoms are common among mothers, with the prevalence of clinical depression postpartum 10-20%. The prevalence of “baby blues”, i.e. depressive symptoms that begin a few days postpartum and that last up to a few weeks, is estimated to be as high as 80% (Perheentupa 2011). Whether or not shared joy could be used as a measure of a functioning mother-infant interaction remains to be seen.

4. Method

4.1. Participants

The current study was a pilot study conducted as a part of a larger research project studying the development of social cognition of infants. Mothers with a young child (under 7-month-old) were recruited from the Tampere region by using the database maintained by the Population Register Center in Finland (Väestörekisterikeskus). The exclusion criteria concerning the mothers were: current use of antidepressant medication, diagnosis of mood disorder, mental retardation, visual or auditory impairment, or significant medical illness. Infant participants were 7-month-old infants of the mothers participating in the study, with approximately equal gender representation. To be eligible for the study, children were required to be born full-term (i.e., between 38 and 42 weeks gestational age), be of normal birth weight, and without history of visual or neurological abnormality. Thirteen mother-infant dyads were randomly selected for the current study from the larger sample recruited for the original study (n=42).

4.3. Assessment of the interaction

The parent was asked to interact by playing with their child for 10-15 minutes. This interaction was videotaped. Upon analysis of these videos, the moments of shared joy were then documented by frequency and duration. Both the face of the mother and of the child had to be viewed simultaneously.

4.4. Assessment of maternal depressive symptoms

Edinburgh Postnatal Depression Scale

Edinburgh Postnatal Depression Scale; EPDS (Cox, Holden & Sagovsky 1987) is a self-report questionnaire originally designed for screening depression among women during the postpartum period, but it has been found also to have satisfactory validity among non-postnatal women (Cox et al. 1996). In the EPDS the mothers are asked to choose from the options those that best describe their feelings during the previous seven days. The scale consists of 10 items scored on a four-step scale from 0 to 3, the maximum score of 30 indicating a high level of depressive symptoms. The EPDS contains questions concerning the presence of negative affect as well as items for positive affect (being able to laugh and see the amusing side of things, optimistic anticipation of events).

4.5. Assessment of infant temperament

Infant Behavior Questionnaire

Infant Behavior Questionnaire; IBQ (Rothbart, 1981) is a parental report with 90 items scored from 1 to 7 and describing infant behavior in everyday situations. The items form 6 subscales of Activity Level, Smiling and Laughter, Distress and Latency to Approach Novel Stimuli (Fearfulness), Distress to Limitations, Soothability, and Duration of Orienting. In this study, Positive Affectivity is a calculated mean of the scores of Activity Level, Smiling and Laughter and Soothability, and Negative Affectivity the mean of the scores of both distress variables.

4.7. Statistical analysis

SPSS 16.0 was used for the hypothesis testing. Means, standard deviations and ranges were used to describe variables. Normality of distribution was tested, and as the variables were not found to be normally distributed, correlation using the Spearman's rho equation was examined. It was also tested whether the background variables independently affected the frequency or duration of the shared joy sequences. Linear regression was used to see whether the background variables had an independent effect on the EPDS scores.

5. Results

5.1. Sample description

Main background variables (mean, standard deviation, range) are given in Table 1. The mean age of mothers was 30,2 (SD 5,1) years, and of infants 215,2 (3,7) days. In this subsample, 69% of infants were male. The mean number of days infants were breastfed after the age of 3 months is given in Table 1, as well as the mean scores, standard deviation and range of the maternal EPDS scores.

Table 1

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
<i>Breastfeeding</i>	11	0,00	100,00	82,4	33,84
<i>EPDS</i>	9	0,00	10,00	4,3	3,90
<i>Age of mother</i> <i>(years)</i>	13			30,2	5,1
<i>Age of child</i> <i>(days)</i>	13			215,2	3,7

Of the 13 mother-infant pairs randomly chosen for this study, only 7 (54%) had sufficiently answered the questionnaires.

The scores for the EPDS and IBQ-questionnaires are presented in Table 2. In the EPDS none of the mothers scored above the clinical cut off point of 13. Two of the mothers scored 10 points,

while 2 mothers scored 0. For 4 of the mothers, the score was missing. The mean of positive affectivity of this sample (4,24) was higher than that of negative affectivity (3,03), indicating that the mothers reported more positive infant behavior than negative.

Table 2

	<i>N</i> <i>valid</i>	<i>N missing</i>	<i>Mean</i>	<i>Std.</i> <i>deviation</i>	<i>Range</i>	<i>Minimum</i>	<i>Maximum</i>
<i>EPDS</i>	9	4	4,3333	3,90512	10,00	0,00	10,00
<i>IBQnegaff</i>	10	3	3,0296	0,55541	1,83	2,28	4,10
<i>IBQposaff</i>	10	3	4,2432	0,31298	0,78	3,81	4,59
<i>IBQactivity</i>	10	3	4,8824	0,75070	2,50	3,86	6,35
<i>IBQdistress</i>	10	3	3,2750	0,65652	1,92	2,61	4,53
<i>IBQfear</i>	10	3	2,2381	0,90325	3,07	1,73	4,80
<i>IBQorienting</i>	10	3	2,4727	0,43855	1,27	2,09	3,36
<i>IBQsmiling</i>	10	3	4,7238	0,68114	2,15	3,58	5,73
<i>IBQsoothability</i>	10	3	5,3095	0,40610	1,15	4,60	5,75

IBQnegaff: IBQ negative affectivity; IBQ posaff: IBQ positive affectivity

5.2. EPDS scores

Hypothesis testing was conducted using nonparametric tests, Kruskal Wallis and ANOVA. Correlations were tested using the Spearman rho's equation. The EPDS scores negatively correlated with the frequency and duration of the shared joy sequences, however the results were not statistically significant.

5.3. Gender

No correlation was found between the infants' gender and either the mothers' EPDS score or the scores for IBQ or the shared joy sequences.

5.5. IBQ- Infant behavior questionnaire

5.5.1. IBQ positive effect

A positive correlation was found between the IBQ scores for positive affect and the sums of the durations of sequences, the duration of the longest sequence, and the mean of the duration of sequences, all $r = 0,804$, $p = 0,029$. This indicates that positive affectivity, which is the mean of Activity Level, Smiling and Laughter and Soothability is correlated with concurrent smiling of mother and child on the videos.

5.5.2. IBQ negative affect

The IBQ scores for negative effect were inversely correlated with the frequency and duration of the shared joy sequences. These results were not statistically significant.

5.5.3. Specific IBQ scores

No statistically significant correlation was found between the IBQ scores for activity, distress, orienting, smiling, or soothability.

An inverse correlation was found between the IBQ score for fear and the sum of the duration of sequences, duration of the longest sequence (for both $r = -0,778$, $p = 0.039$) and the mean duration of sequences ($r = 0,852$, $p = 0,015$). As the IBQ questionnaire states that fear is the baby's habit of showing distress or startle to sudden changes in stimulation, novel physical objects or social stimuli; inhibited approach to novelty (Gartstein, Rothbart 2003), it suggests that the infants that are in fact more reserved and introverted have less shared mutual joy with their mothers.

Scores are represented in Table 3 below.

Table 3

	<i>Numb er of seque nces</i>	<i>Sum of sequen ces, no missin g</i>	<i>% duration of sequence s/duratio n of video, no missing</i>	<i>Sum of sequence s, missing included</i>	<i>% duration of sequence s/duratio n of video, missing included</i>	<i>Duration of shortest sequence</i>	<i>Duration of longest sequence</i>	<i>Mean duration of sequece s, no missing</i>	<i>Mean duration of sequece s, missing included</i>
<i>EPDS</i>	-,387	-,262	-,262	-,287	-,287	0	-,262	-,262	-,287
<i>p</i>	,303	,571	,571	,455	,455	0	,571	,571	,455
<i>N</i>	9	7	7	9	9	7	7	7	9
<i>IBQactivity</i>	-,332	,037	,037	-,232	-,232	-,204	,037	,037	-,259
	,348	,937	,937	,519	,519	,661	,937	,937	,469
	10	7	7	10	10	7	7	7	10
<i>IBQdistress</i>	-,068	-,259	-,259	-,191	-,191	-,612	-,259	-,408	-,273
	,853	,574	,574	,597	,597	,144	,574	,364	,445
	10	7	7	10	10	7	7	7	10
<i>IBQfear</i>	-,246	-,778	-,778	-,567	-,567	-,612	-,778	-,852	-,608
	,493	,039*	,039*	,088	,088	,144	,039*	,015*	,062
	10	7	7	10	10	7	7	7	10
<i>IBQorienting</i>	,062	,556	,556	,239	,239	,204	,556	,482	,184
	,866	,195	,195	,506	,506	,661	,195	,274	,610
	10	7	7	10	10	7	7	7	10
<i>IBQsmiling</i>	,086	,408	,408	,305	,305	,408	,408	,482	,353
	,812	,364	,364	,392	,392	,364	,364	,274	,317
	10	7	7	10	10	7	7	7	10
<i>IBQsoothabil</i>	,234	,455	,455	,225	,225	0.00	,455	,334	,184
	,515	,317	,317	,531	,531	1,000	,317	,465	,610
	10	7	7	10	10	7	7	7	10
<i>IBQnegaff</i>	-,108	-,617	-,617	-,387	-,387	-,618	-,617	-,711	-,449
	,766	,140	,140	,269	,269	,139	,140	-,0,74	,193
	10	7	7	10	10	7	7	7	10
<i>IBQposaff</i>	,142	,804	,804	,425	,425	,515	,804	,804	,425
	,696	,029*	,029*	,221	,221	,237	,029*	,029*	,221
	10	7	7	10	10	7	7	7	10

* correlation is significant at the 0,05 level.

Regression analysis showed that infants' gender or breastfeeding did not have a statistically significant effect on the EPDS scores.

6. Discussion

The aim of this study was to examine whether the moments of expressed shared joy between mother and child were dependent on the mothers level of depression or on the child's temperament. Additionally whether or not the child's perceived temperament was affected by the mother's level of depression was investigated. The results indicated that the duration of shared joy and a mother's perception of her child as positively affective were correlated, and that a mother's perception of her child as fearful negatively correlated with the duration of shared joy. Contrary to expectations, the mothers' scores on the EPDS questionnaire for detecting depression in this study did not have an effect on either the quantity or duration of shared joy or on the mothers perception of her child's temperament.

Previous research has indicated that depressed women are involved in fewer positive interactions with their child (Cox et al. 1987). This is seen in each communicative field - facial expression, voice, touch – and the quantity, quality and the timing of depressed mothers' social and affective behavior are distorted in ways that contrast with non-depressed mothers. The effects of this are reflected onto the child's social, emotional and cognitive functioning. (Cohn et al. 1986.) In 2010 Stein et al studied mothers' responses to emotional stimuli, and found that both depressed and well mothers rated faces as more negative or positive when exposed for longer periods of time, and concluded that the length of the exposure to emotional stimuli affects the judgment of the valence of the expression. They found that with prolonged exposure to negative infant faces, depressed mothers rated the faces as more negative than well mothers. This difference was only observed for negative stimuli, and not for the positive faces. (Stein et al. 2010.) A previous study by Puura et al revealed a moderate correlation was between IBQ negative affectivity and maternal depressive symptoms (Puura et al. 2013). The scope of the current study was small, which may have resulted in the fact that a similar correlation was not found.

The likelihood for the depressive symptoms to have an effect on the interaction increases with the severity, timing and the chronicity of the depressive symptoms (Brennan et al. 2000).

As none of the mothers in this trial scored above the cutoff point of 13 which is used for clinical relevance, the chance of finding an association that is significant decreases. The chronicity or the timing of the depressive symptoms was not evaluated, and therefore the effect of these variables cannot be determined.

The infant too plays an important role in the interaction. Thus, even if the quality of the mother's interaction is poor, the level of communication may be sufficient enough for the overall interaction to be rated as normal (Weinberg, Tronick 1998a). This may also support the finding in this study that the mothers scoring higher on the EPDS did not differ significantly on the occurrence of shared joy.

Positive mutuality, or shared joy, is the goal to which parent and child instinctively strive for. In positive mother-child relationships, infants with high negative emotionality developed significantly better self-regulated compliance than infants with low negative emotionality (Kim, Kochanska 2012). A lack of concurrent pleasure during what should be a reciprocal and mutually rewarding instance of interaction alters a mother's perception of the positive emotionality of her infant (Hane et al. 2006). In addition to this, highly positive maternal affect accompanied by negative or neutral infant affect has been found to precede the development of an insecure attachment relationship. This is thought to be an indication of especially a lack of affective sharing. (Pauli-Pott, Mertesacker 2009.)

Positive affectivity is the calculated mean of the scores for the child's activity level, smiling and laughter and soothability. A positive correlation was found in this study between the duration of the shared joy sequences and the positive affectivity of the infant. However, causality cannot be deduced from this correlation, as it is logical that the infants that are more prone to smile would also smile during the videotaping.

Does synchronous smiling truly imply mutual positive affect? Reactive smiling can be also be regarded as a reflective impulse, and therefore may occur without the actual feeling of happiness (Yale et al. 2003). Furthermore, it is possible that a highly empathetic child persistently attempts to lift the spirits of a depressed caretaker by smiling and striving for eye contact. It has in fact been suggested that the infant of a depressed mother might become

exceedingly sensitive to the mother's emotional state in order to read her better and to better regulate the interaction. (Tronick 1989.)

Postnatal depression and infant temperament cannot be treated as completely separate phenomena. It has been previously demonstrated in studies that maternal perceptions of infant temperament are related to the quality of mother-infant interactive behavior (Hane et al. 2006). In addition to this, research has shown that maternal perception of the child's temperament as difficult was related to maternal depression (Whiffen 1990). Postpartum depressed mothers' views may be skewed toward being more negative both on the infant's behavior and on their own parenting. Moreover, the depression-related behavior may exacerbate infant distress, thus rendering the infant more difficult, and further inducing or aggravating the mother's depression. (Stein et al. 1991, Whiffen, Gotlib 1989.) In 2005 Kivijärvi et al found that infant temperament characteristics remained relatively to highly stable between the ages of 6 months to 1 year. One of the mediating pathways for this is thought to be maternal sensitivity. (Kivijarvi et al. 2005.) The effects of the quality of care across the first 4.5 years of life on behavioral problems and social skills were evident only in the case of children scoring high on difficult temperament in the first 6 months of life (Pluess, Belsky 2010).

Parental negative affectivity, which has been linked to depression, has been shown to be predictive of increased parental report for fear (Gartstein, Marmion 2008). In the current study, the scores for fear were inversely correlated with the duration of shared joy sequences, even though the component for negative affectivity did not correlate significantly. Fear is the infants' inclination to have an inhibited approach to novel stimuli (Gartstein, Rothbart 2003). The results of this study suggests that the infants that are more reserved and introverted have less shared mutual joy with their mothers. It is probable that these infants were especially affected by the novelty of a third party videotaper, and thus the quality of the interaction and the occurrences of shared joy are likely to be influenced. Nevertheless, it may also be an indication of the fact that the infants that are more reserved and inhibited do not share as many joyous moments with their mothers. Furthermore, mothers' reports of fear are thought to reflect a broad construct of negative emotionality (Parade, Leerkes 2008). This finding is of reduced shared joy is important, as negative infants receiving insensitive maternal interaction are especially at risk for further developmental problems. Children expressing higher

negative effect have been shown to benefit significantly from parenting interventions when there were problems with interaction. (Kim, Kochanska 2012.)

6.1. Limitations

As the present study was designed as a pilot study, the most notable limitation was the size of the sample. In addition, only 54% of the mother-infant dyads had sufficient data for both questionnaires. Due to this, significant findings were unlikely. It is also possible that such a small sample increases the risk of bias from outliers, as each participant is highly weighted. However, it is more likely that true association fails to emerge as significant.

In addition to the small sample size, the variation within the sample is small. This is due to the selection of the population, as participating in the study was voluntary and required effort from the parent. It can be speculated that mothers with clinically relevant postnatal depression most likely experience problems in their daily activities, and consequently would not find the additional resources needed for partaking in the study. Therefore the findings cannot be extrapolated into the general population.

Even though the videotaping was conducted in the home of the participants to reduce the effect that a controlled clinical environment has on the interaction, a third party observer can affect the interaction and conduct of both mother and child. It is possible that an otherwise less engaged mother puts on a brave face for the camera, or that a curious infant pays more attention to the camera and the novel person behind it.

Maternal sensitivity and quality of attachment were not evaluated. In previous studies postpartum depression, child temperament and mutual affect have been shown to correlate with attachment security (Teti et al. 1995, De Wolff, van Ijzendoorn 1997). The fact that the children of depressed mothers have displayed heterogeneous outcome in previous studies has been linked to the differences in attachment between mother and child (Teti et al. 1995). Taking these factors into consideration could have further elucidated the matter of how shared joy as an interactive mean affects the quality of attachment.

7. Conclusions

Overall, positive interaction has been studied less, and less attention has been paid to it as opposed to the negative signals indicating problems with early interaction.

A more extensive study elucidating these phenomena is to be conducted, and the findings of this study further explored.

8. References

- Bates, J.E., Freeland, C.A. & Lounsbury, M.L. 1979, "Measurement of infant difficultness.", *Child development*, vol. 50, no. 3, pp. 794-803.
- Brennan, P.A., Hammen, C., Andersen, M.J., Bor, W., Najman, J.M. & Williams, G.M. 2000, "Chronicity, severity, and timing of maternal depressive symptoms: relationships with child outcomes at age 5.", *Developmental psychology*, vol. 36, no. 6, pp. 759-766.
- Cohn, J.F., Matias, R., Tronick, E.Z., Connell, D. & Lyons-Ruth, K. 1986, "Face-to-face interactions of depressed mothers and their infants.", *New directions for child development*, , no. 34, pp. 31-45.
- Cox, A.D., Puckering, C., Pound, A. & Mills, M. 1987, "The impact of maternal depression in young children.", *Journal of Child Psychology & Psychiatry & Allied Disciplines*, vol. 28, no. 6, pp. 917-928.
- Cox, J.L., Chapman, G., Murray, D. & Jones, P. 1996, "Validation of the Edinburgh Postnatal Depression Scale (EPDS) in non-postnatal women.", *Journal of affective disorders*, vol. 39, no. 3, pp. 185-189.
- Cox, J.L., Holden, J.M. & Sagovsky, R. 1987, "Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale.", *British Journal of Psychiatry*, vol. 150, pp. 782-786.
- De Wolff, M.S. & van Ijzendoorn, M.H. 1997, "Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment.", *Child development*, vol. 68, no. 4, pp. 571-591.
- Derryberry, D. & Rothbart, M.K. 1988, "Arousal, affect, and attention as components of temperament.", *Journal of Personality & Social Psychology*, vol. 55, no. 6, pp. 958-966.
- Field, T. 1995, "Infants of depressed mothers", *Infant behavior & development*, vol. 18, no. 1, pp. 1-14.
- Foreman, D.M. & Henshaw, C. 2002, "Objectivity and subjectivity in postnatally depressed mothers' perceptions of their infants.", *Child Psychiatry & Human Development*, vol. 32, no. 4, pp. 263-275.
- Gartstein, M.A. & Marmion, J. 2008, "Fear and positive affectivity in infancy: convergence/discrepancy between parent-report and laboratory-based indicators.", *Infant Behavior & Development*, vol. 31, no. 2, pp. 227-238.
- Gartstein, M.A. & Rothbart, M.K. 2003, "Studying infant temperament via the Revised Infant Behavior Questionnaire", *Infant Behavior and Development*, vol. 26, no. 1, pp. 64-86.
- Hane, A.A., Fox, N.A., Polak-Toste, C., Ghera, M.M. & Guner, B.M. 2006, "Contextual basis of maternal perceptions of infant temperament.", *Developmental psychology*, vol. 42, no. 6, pp. 1077-1088.
- Kim, S. & Kochanska, G. 2012, "Child temperament moderates effects of parent-child mutuality on self-regulation: a relationship-based path for emotionally negative infants.", *Child development*, vol. 83, no. 4, pp. 1275-1289.
- Kivijarvi, M., Raiha, H., Kaljonen, A., Tamminen, T. & Piha, J. 2005, "Infant temperament and maternal sensitivity behavior in the first year of life.", *Scandinavian Journal of Psychology*, vol. 46, no. 5, pp. 421-428.
- Lenzi, D., Trentini, C., Pantano, P., Macaluso, E., Iacoboni, M., Lenzi, G.L. & Ammaniti, M. 2009, "Neural basis of maternal communication and emotional expression processing during infant preverbal stage.", *Cerebral Cortex*, vol. 19, no. 5, pp. 1124-1133.
- Luoma, I., Tamminen, T., Kaukonen, P., Laippala, P., Puura, K., Salmelin, R. & Almqvist, F. 2001, "Longitudinal study of maternal depressive symptoms and child well-being.", *Journal of the American Academy of Child & Adolescent Psychiatry*, vol. 40, no. 12, pp. 1367-1374.

- Malatesta, C.Z., Culver, C., Tesman, J.R. & Shepard, B. 1989, "The development of emotion expression during the first two years of life.", *Monographs of the Society for Research in Child Development*, vol. 54, no. 1-2, pp. 1-104.
- Mantymaa, M., Puura, K., Luoma, I., Salmelin, R., Davis, H., Tsiantis, J., Ispanovic-Radojkovic, V., Paradisiotou, A. & Tamminen, T. 2003, "Infant-mother interaction as a predictor of child's chronic health problems.", *Child: Care, Health & Development*, vol. 29, no. 3, pp. 181-191.
- Mantymaa, M., Puura, K., Luoma, I., Salmelin, R.K. & Tamminen, T. 2006, "Mother's early perception of her infant's difficult temperament, parenting stress and early mother-infant interaction.", *Nordic Journal of Psychiatry*, vol. 60, no. 5, pp. 379-386.
- McGrath, J.M., Records, K. & Rice, M. 2008, "Maternal depression and infant temperament characteristics.", *Infant Behavior & Development*, vol. 31, no. 1, pp. 71-80.
- Murray, L. & Cooper, P. 1997a, "Effects of postnatal depression on infant development.", *Archives of Disease in Childhood*, vol. 77, no. 2, pp. 99-101.
- Murray, L. & Cooper, P.J. 1997b, "Postpartum depression and child development", *Psychological medicine*, vol. 27, no. 2, pp. 253-260.
- Murray, L., Fiori-Cowley, A., Hooper, R. & Cooper, P. 1996, "The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome.", *Child development*, vol. 67, no. 5, pp. 2512-2526.
- Parade, S.H. & Leerkes, E.M. 2008, "The reliability and validity of the Infant Behavior Questionnaire-Revised.", *Infant Behavior & Development*, vol. 31, no. 4, pp. 637-646.
- Pauli-Pott, U. & Mertesacker, B. 2009, "Affect expression in mother-infant interaction and subsequent attachment development.", *Infant Behavior & Development*, vol. 32, no. 2, pp. 208-215.
- Perheentupa, A. 2011, *Synnytyksen jälkeiset psyykkiset häiriöt*, Kustannus Oy Duodecim.
- Pluess, M. & Belsky, J. 2010, "Differential susceptibility to parenting and quality child care.", *Developmental psychology*, vol. 46, no. 2, pp. 379-390.
- Puura, K., Mäntymaa, M., Leppänen, J., Peltola, M., Salmelin, R., Luoma, I., Latva, R. & Tamminen, T. 2013, "Associations between maternal interaction behavior, maternal perception of infant temperament, and infant social withdrawal.", *Infant Mental Health Journal*, vol. 34, no. 6, pp. 586-593.
- Stein, A., Arteche, A., Lehtonen, A., Craske, M., Harvey, A., Counsell, N. & Murray, L. 2010, "Interpretation of infant facial expression in the context of maternal postnatal depression.", *Infant Behavior & Development*, vol. 33, no. 3, pp. 273-278.
- Stein, A., Gath, D.H., Bucher, J., Bond, A., Day, A. & Cooper, P.J. 1991, "The relationship between post-natal depression and mother-child interaction.", *British Journal of Psychiatry*, vol. 158, pp. 46-52.
- Teerikangas, O.M., Aronen, E.T., Martin, R.P. & Huttunen, M.O. 1998, "Effects of infant temperament and early intervention on the psychiatric symptoms of adolescents.", *Journal of the American Academy of Child & Adolescent Psychiatry*, vol. 37, no. 10, pp. 1070-1076.
- Teti, D.M., Gelfand, D.M., Messinger, D.S. & Isabella, R. 1995, "Maternal Depression and the Quality of Early Attachment: An Examination of Infants, Preschoolers, and Their Mothers", *Developmental psychology*, vol. 31, no. 3, pp. 364-376.
- Trevarthen, C. & Aitken, K.J. 2001, "Infant intersubjectivity: research, theory, and clinical applications", *Journal of Child Psychology & Psychiatry & Allied Disciplines*, vol. 42, no. 1, pp. 3-48.
- Tronick, E. & Reck, C. 2009, "Infants of depressed mothers", *Harvard review of psychiatry*, vol. 17, no. 2, pp. 147-156.

- Tronick, E.Z. 1989, "Emotions and emotional communication in infants", *American Psychologist*, vol. 44, no. 2, pp. 112-119.
- Weinberg, M.K. & Tronick, E.Z. 1998a, "Emotional characteristics of infants associated with maternal depression and anxiety", *Pediatrics*, vol. 102, no. 5 Suppl E, pp. 1298-1304.
- Weinberg, M.K. & Tronick, E.Z. 1998b, "The impact of maternal psychiatric illness on infant development", *Journal of Clinical Psychiatry*, vol. 59, no. Suppl 2, pp. 53-61.
- Weinberg, M.K. & Tronick, E.Z. 1994, "Beyond the Face: An Empirical Study of Infant Affective Configurations of Facial, Vocal, Gestural, and Regulatory Behaviors", *Child development*, vol. 65, no. 5, pp. 1503-1515.
- Whiffen, V.E. 1990, "Maternal depressed mood and perceptions of child temperament.", *Journal of Genetic Psychology*, vol. 151, no. 3, pp. 329-339.
- Whiffen, V.E. & Gotlib, I.H. 1989, "Infants of postpartum depressed mothers: temperament and cognitive status.", *Journal of abnormal psychology*, vol. 98, no. 3, pp. 274-279.
- Yale, M.E., Messinger, D.S., Cobo-Lewis, A.B. & Delgado, C.F. 2003, "The temporal coordination of early infant communication.", *Developmental psychology*, vol. 39, no. 5, pp. 815-824.